

# PATENT SPECIFICATION

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## (54) MOBILE STORAGE EQUIPMENT

(71) We, BLAKDALE PRODUCTS LIMITED, a British company, of Howard Way, Harlow, Essex, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to mobile storage equipment comprising a plurality of mobile units known in the art as bays. The frame of each bay is furnished with one or more of a variety of fittings such as a closed back and sides, open or closed shelving, cupboards, cabinets, pigeon hole dividers, open or closed bins, trays, drawers and so on, depending on the nature of the goods to be stored therein or thereon, and comprises an undercarriage or chassis which runs on floor tracks, usually rails secured to the floor.

By employing mobile bays it is possible to achieve an increase in the storage capacity per unit floor area because the bays can be located closer together and moved to one side along the rail track when access is required to a row of bays behind. One successful arrangement employs two rows of mobile bays closely placed in front of a rear row of fixed bays.

However, quite considerable effort may be required to manually move such mobile bays particularly when they are heavily laden and this effort may be beyond female store attendants whose task involves attaining access to the various bays. The invention therefore aims to mechanise the necessary movement of the bays but by means which do not require a large capital expenditure and which are simple and safe to operate.

According to one aspect of the invention, a storage bay comprises a wheeled chassis of which at least one wheel is coupled to a power input shaft that is accessible for releasably securing a portable driving motor.

According to another aspect of the invention, a mobile storage equipment installation comprises a plurality of such storage bays and a portable electric motor adapted to be releasably coupled to the input shaft of a selected one bay, a single motor being provided to be common to a group of bays or to the bays of the entire installation.

According to yet another aspect of the invention, there is provided a wheeled storage bay having means whereby a portable driving motor can be detachably secured for driving the bay.

The electric motor may be a modified portable power tool with a reversible motor, trigger and chuck. If the power input shafts are mounted in sockets on the sides of the bays it is then a simple matter to plug the chuck of the tool into the socket of whichever bay needs to be moved. The electric cable to the tool can be slung from a drum on the ceiling.

In the preferred constructions, an entire axle of the wheeled chassis is power driven through reduction gearing and/or sprocket chains or belts coupled to the input shaft.

The input shaft will normally be above the driven wheel or wheels but it would be possible to connect the motor directly to the axle shaft.

It is desirable to incorporate a safety device for disconnecting the drive from the driven wheel or wheels and preferable also for braking the bay.

An example of the invention is illustrated in the diagrammatic accompanying drawings wherein:—

Fig. 1 is a perspective view of a row of mobile storage bays;

Fig. 2 is an exploded perspective view partly broken away of a power input unit for mounting on a bay, the view also showing the cover of the unit and part of the chassis of the bay;

Fig. 3 is an exploded view of the plug-in

socket of the unit shown in Fig. 2 and a hand power tool;

Fig. 4 is a vertical section through the unit shown in Fig. 2;

5 Fig. 5 is a horizontal section on the line V—V of Fig. 4; and

Fig. 6 is a front view of part of a safety device shown in Figs. 4 and 5.

The storage bays 1 shown diagrammatically 10 in Fig. 1 each have a wheeled chassis 2 (Fig. 2) which runs along a rail track 3 on the floor in either of the directions of the arrows 4 and rubber bumpers 10 to prevent damage if they run one into another. The chassis 2 has two 15 non-driven wheels (not shown) and a power driven axle 7 carrying two further wheels 8 (only one is visible). Each bay carries a power input unit enclosed by a casing 13 and connected to the shaft 7 by a tube-enclosed half-dog clutch 22, 23. The units each have a socket 20 16 into which a hand power tool 14 can be plugged when the bay in question is to be moved. The power input unit is readily attachable to and detachable from the bay so that 25 bays can be sold for conventional manual handling and converted by the attachment of a power input unit if desired at a later date.

The power input unit will now be described in more detail with reference to Figs. 2 to 30 6 of the drawings. The socket 16 surrounds a hexagonal end portion of an input shaft 9. The shaft 9 is carried in a bearing assembly shown generally 50 and mounted for limited vertical adjustment. The adjustment is effected 35 by a screw adjuster 51 on the opposite side of the shaft 9 to a horizontal pivotal mounting 52 for the assembly 50. The input shaft 9 drives an intermediate shaft 15 through a reduction belt drive 12 and the intermediate 40 shaft 15 drives an output or drive shaft 25 carrying the half dog 22, through reduction gearing 11.

The belt drive 12 comprises a toothed belt 53 and toothed pulleys 54 and 55 keyed to 45 the input shaft 9 and the intermediate shaft 15 respectively. Guide pulleys 56, 57 engage the back of the belt 53 near the upper end of each run. The reduction gearing 11 comprises a gear 58 which is keyed on the intermediate shaft 15 and which meshes with a gear 50 59 mounted on the output shaft 25. The gear 59 is axially movable along the shaft 25 but is constrained to rotate with it by balls 60 partially located in grooves in the shaft 25 and 55 partially located in grooves in the gear 59 (see Figs. 4 and 5). Three sets of balls and grooves are used and they are disposed symmetrically around the shaft 25. The gear 59 is urged into a position engaging the gear 58 by a 60 compression spring 61 but can be displaced against the action of the spring 61 by a safety device shown generally at 20 and operable by a longitudinally slidable rod 19 connected to a pressure bar on the bay (not shown).

65 The safety device comprises a frame

member 62 on which a lever 63 is pivotally 70 mounted for horizontal movement between limits set by a slot in the member 62 through which its free end extends. The lever 63 carries a wheel 64 which can engage both the gear 59 and a depression 65 in the rod 19. As will be seen particularly from Fig. 5, the wheel 64 is pressed against the rod 19 by a 75 tension spring 66 extending between the frame member 62 and a plate 67 secured by a stud 68 on which the wheel 64 is mounted. The rod 19 is urged by springs 71, 72 into an intermediate position in which the depression 65 is opposite the wheel 64 but displacement of 80 the rod 19 in either direction will serve to displace the wheel 64 and thus the gear 59 against the action of the spring 61. After the lever 63 has moved a short distance the spring 66 moves over the pivot point of the lever 63 and completes the disengagement of the 85 gear 59 from the gear 58, the relative strengths of the springs 66 and 61 being appropriately selected for this purpose. The device can be reset by pushing back the projecting free end of the lever 63 until the spring 66 again passes 90 over the pivot point. The longitudinal movement of the rod 19 necessary to operate the device can be adjusted by mounting it in a laterally adjustable bearing plate 69. When the gear 59 is fully disengaged from the gear 58, 95 it is arranged to be braked by a brake ring 21.

Fig. 3 shows how a power hand tool 14 having a hexagonal chuck (not shown) can be plugged into the socket 16 to drive the unit. 100 The socket 16 has a slot 71 for receiving a fixed projection on the tool and thereby taking up the torque reaction of the tool.

An electric cable 17 for the tool 14 is suspended from a self-reeling drum 18 on the 105 ceiling where the cable can be electrically connected to the mains.

It will now be evident that whenever the power tool 14 which is common to all the bays 1 is plugged into a chosen bay and the trigger 110 is depressed the bay will be driven in the direction chosen by a reversing switch 72 for the motor of the tool.

Various modifications are possible. For example instead of a reversible motor with an 115 electric reversing switch the direction of travel could be selected by a lever connected to a reversing gear in the gearing 11.

WHAT WE CLAIM IS:—

1. A storage bay comprising a wheeled chassis of which at least one wheel is coupled to 120 a power input shaft that is accessible for releasably securing a portable driving motor.

2. A storage bay according to claim 1, wherein the power input shaft is above the 125 wheel or wheels.

3. A storage bay according to claim 2, wherein the power input shaft is part of a detachable power input unit.

4. A storage bay according to claim 2 or 130

- 3, which comprises a drive shaft connected to the wheel or wheels, the input and drive shafts being interconnected through a belt or sprocket chain drive.
- 5 5. A storage bay according to claim 4, wherein the shafts are interconnected through a belt or sprocket chain drive and gearing arranged in series.
- 10 6. A storage bay according to claim 5, wherein the gearing is arranged so that gears can be disengaged to disconnect the shafts when a safety device is operated.
- 15 7. A storage bay according to claim 6, wherein disengagement is effected automatically when the safety device is tripped.
- 20 8. A storage bay according to claim 7, wherein the safety device comprises a pivoted lever and a spring arranged so that when the lever is moved past an intermediate position the spring urges it forward.
- 25 9. A storage bay according to any one of claims 4 to 8, wherein the drive shaft is connected to the wheel or wheels through an axially disconnectable coupling.
10. A storage bay according to any preceding claim wherein the input shaft has an end portion having a non-circular cross section so that the driving motor can be secured by movement in an axial direction.
11. A storage bay according to claim 10 30 wherein the end portion of the input shaft is in a socket.
12. A storage bay according to claim 11 35 wherein the socket is shaped to take up the torque reaction of the motor.
13. A storage bay substantially as hereinbefore described with reference to the accompanying drawings.
14. A wheeled storage bay having means 40 whereby a portable driving motor can be detachably secured for driving the bay.
15. A mobile storage equipment installation 45 comprising a plurality of storage bays according to claim 1 or 2 and a portable electric motor adapted to be releasably coupled to the input shaft of a selected one bay, a single motor being provided to be common to a group of bays or to the bays of the entire installation.
16. An installation according to claim 15 50 wherein the storage bays are as defined in any one of claims 4 to 13.

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1233393 COMPLETE SPECIFICATION  
5 SHEETS *This drawing is a reproduction of  
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Sheet 1

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Sheet 1









